as to how much current radiological techniques have improved the prognosis in pancreatic cancers. Clearly advances are needed in the early diagnosis of pancreatic disease in general, and cancer in particular, and the solution may well not lie within the field of the radiologist.

Given that the present situation is unsatisfactory, what course should the clinician follow? It will be apparent that no one technique is ideal; however, some methods and combinations of of methods are better employed than others in particular situations. Our experience is in agreement with that of Eaton *et al.* (1968) who have proposed the following diagnostic combinations: (1) For cancer of the head of pancreas, hypotonic duodenography and selective arteriography (and on the basis of our experience isotopic scanning). (2) For cancer of the body and tail, isotopic scanning and selective arteriography. (3) For pancreatitis, isotopic scanning and hypotonic duodenography. (4) For pancreatic pseudocyst, the conventional barium meal and selective arteriography.

REFERENCES
Beranbaum S L (1966) *Amer. J. Roentgenol.* **96**, 447
Bilbao M K, Frische L M, Dotter C T & Rösch J (1967) *Radiology* **89**, 438
Bouchier I A D (1969) *Proc. roy. Soc. Med.* **62**, 885
Eaton S B, Fleischli D J, Pollard J J, Nebesar R A & Potsaid M S (1968) *New Engl. J. Med.* **279**, 389
Eyler W R, Clark M D & Rian R L (1962) *J. Amer. med. Ass.* **181**, 967
Kreel L (1968) *Proc. roy. Soc. Med.* **62**, 881
McCarthy D M & Bouchier I A D (1969) Presented at the IV European Pancreatic Club, Göttingen (unpublished)
McCarthy D M & Brown P (1969) *Gut* **10**, 913
McCarthy D M, Kreel L, Agnew J E & Bouchier I A D (1969) *Gut* **10**, 665
Melmed R N, Agnew J E & Bouchier I A D (1968) *Quart. J. Med.* **37**, 607
Nebesar R A & Pollard J J (1967) *Radiology* **89**, 1017

Mr J Hermon-Taylor[1]
(Gastroenterology Unit, Mayo Clinic, Rochester, Minnesota, USA)

A Review of Pancreatic Transplantation in Man, and Function of the Pancreaticoduodenal Graft

The present status of human pancreatic transplantation may be summarized as follows. Pancreatic duct ligation in animals emphasized the necessity to preserve free drainage of exocrine secretion for continued adequate insulin production by the beta cells (Dragstedt 1943, Idezuki *et al.* 1969). Since the first human pancreatic transplant (Kelly *et al.* 1967), 6 other patients at the University Hospitals, Minneapolis, have received a pancreaticoduodenal allograft. Ages ranged from 20 to 44 years and each patient presented with a long history of 'brittle', juvenile-type diabetes mellitus that had progressed to end-stage renal failure necessitating kidney transplantation (Lillehei *et al.* 1967). In each case the pancreas was obtained from the same cadaveric donor with the duodenal loop attached to act as a conduit for exocrine secretion in the manner established experimentally by De Jode & Howard (1962). The pancreaticoduodenal allograft was placed in the left iliac fossa of the recipient, vascular anastomosis being made to the external iliac vessels. In one patient insulin production from the grafted pancreas failed because of ischæmia, and in another because of rejection. The remaining 5 patients, however, required no insulin therapy from the time of operation; glucose tolerance, fasting and tolbutamide-stimulated plasma insulin levels were within normal limits. Two of these patients subsequently died of infection and one, six months later, of hyperkalæmia. The remaining 2 patients are at home alive and well with normal glucose tolerance and insulin response to tolbutamide stimulation, four and seven months after transplantation (Lillehei 1969, personal communication).

In one patient exocrine function of the pancreatic allograft three months after transplantation was contrasted with endocrine, absorptive and electrical functions of the grafted duodenum (DiMagno *et al.* 1969). Pancreatic exocrine function was normal, whereas duodenal function was variably impaired. These findings subsequently correlated with the histological appearances of the grafted pancreas and duodenum at autopsy and would support the concept of differential rejection by a recipient of various tissues from the same donor.

It is too early yet to say whether correction of glucose metabolism by pancreatic transplantation will arrest or reverse the complications of diabetes mellitus in these patients.

REFERENCES
De Jode L R & Howard J M (1962) *Surgery* **114**, 553
DiMagno E P, Hermon-Taylor J, Go V L W, Lillehei R C & Summerskill W H J (1969) *J. Lab. clin. Med.* **74**, 869
Dragstedt L R (1943) *Ann. Surg.* **118**, 576
Idezuki Y, Goetz F C & Lillehei R C (1969) *Amer. J. Surg.* **117**, 33
Kelly W D, Lillehei R C, Merkel F K, Idezuki Y & Goetz F C (1967) *Surgery* **61**, 827
Lillehei R C, Idezuki Y, Feemster J A, Dietzman R H, Kelly W D, Merkel F K, Goetz F C, Lyons G W & Manax W G (1967) *Surgery* **62**, 721

[1]Present address: Surgical Unit, The London Hospital, London E 1